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term memory, and the capacity of our short-term memory is sharply limited (Baddeley, 1999). Attention is critical. Learners must filter out extraneous information and sharpen their focus on the most salient details of their environment. Instead of focusing on narrowing attention, young people often respond to a rich media environment by multi-tasking—scanning for relevant shifts in the information flow while simultaneously taking in multiple stimuli. Multi-tasking and attention should not be seen as oppositional forces. Rather, we should think of them as two complementary skills, both strategically employed by the brain to intelligently manage constraints on short-term memory. Whereas attention seeks to prevent information overload by controlling what information enters short-term memory, successful multi-taskers seek to reduce demands on short-term memory by mapping where different information is externally stored within their immediate environment.

In *Growing up Digital*, Brown (2002) describes an encounter he had:

Recently I was with a young twenty-something who had actually wired a Web browser into his eyeglasses. As he talked with me, he had his left hand in his pocket to cord in key-strokes to bring up my Web page and read about me, all the while carrying on with his part of the conversation! I was astonished that he could do all this in parallel and so unobtrusively.... People my age tend to think that youth who are multiprocessing can't be concentrating. That may not be true. Indeed, one of the things we noticed is that the attention span of the teens at PARC—often between 30 seconds and five minutes—parallels that of top managers, who operate in a world of fast context-switching. So the short attention spans of today's youth may turn out to be far from dysfunctional for future work worlds.

Currently, young people are playing with these skills as they engage with games or social activities that reward the ability to maintain a mental picture of complex sets of relationships and to adjust quickly to shifts in perceptual cues. The multi-tasking process is already evident in the “scrawl” on television news: the screen is a series of information surfaces, each containing a relevant bit of data, none of which offers the complete picture (Jenkins, 2003). Our eyes scan across electoral maps and ticker tapes, moving images and headlines, trying to complete a coherent picture of the day's events, and to understand the relationship between the visuals. Similarly, as Kress (2003) notes, the contemporary textbook increasingly deploys a broader array of different modalities as it represents information students need to know about a given topic. Here, again, readers are being taught to scan the informational environment rather than fix attention on a single element.

Historically, we might have distinguished between the skills required of farmers and those expected of hunters. The farmer must complete a sequence of tasks that require localized attention; the hunter must scan a complex landscape in search of signs and cues of where their prey may be hiding. For centuries, schools have been designed to create “farmers” (Hartmann, 1999). In such an organization, the ideal is for all students to focus on one thing, and, indeed, attention is conceived of as the ability to concentrate on one thing for an extended period of time, while the inability or refusal to maintain such a narrow focus is characterized as a “disorder.” Yet, fixed attention would be maladjusted to the needs of hunters, who must search high and low for their game. Schools adapted to the needs of hunters would have very different practices and might



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well value the ability to identify the relationship between seemingly unrelated developments within a complex visual field. As we look to the future, one possibility is that schools will be designed to support both hunters and farmers, ensuring that each child develops multiple modes of learning, multiple strategies for processing information. In such a world, neither attentional style is viewed as superior, but both are assessed in terms of their relative value within a given context.

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Multi-tasking often is confused with distraction, but as understood here, multi-tasking involves a method of monitoring and responding to the sea of information around us. Students need help distinguishing between being off task and handling multiple tasks simultaneously. They must learn to recognize the relationship between information coming at them from multiple directions and making reasonable hypotheses and models based on partial, fragmented, or intermittent information (all part of the world they will confront in the workplace). They need to know when and how to pay close attention to a specific input as well as when and how to scan the environment searching for meaningful data.

## **What Might Be Done**

Multitasking enters pedagogical practice when teachers recognize the desires of contemporary students to come at topics from multiple directions all at the same time or to maintain what some have called “continuous partial attention,” interacting with homework materials while engaged in other activities.

- A teacher’s assistant blogs in real time in response to the classroom instructor’s lectures, directing students’ attentions to relevant links that illustrate and enhance the content being discussed, rather than providing distractions from the core activity. Students are encouraged to draw on this related material as they engage in classroom discussion, grounding their comments in specific examples and quotations from relevant documents.
- At the Brearley School in Manhattan, foreign language class materials are transferred directly from the school’s computer servers to students’ iPods. Rather than needing to set aside dedicated study time to practice a foreign language, this allows students to access their homework and foreign songs while walking home from classes or while engaging in other activities (Glassman, 2004).
- The online game *cybernations.net*, a simulation game that helps players learn about nation-building and international diplomacy, breaks player actions down into distinct choices that can be made at the player’s own pace. This encourages players to keep a browser window open to periodically check in on updates from their nation throughout the day while working on other tasks, rather than playing the game only during a dedicated play time. Homework assignments in the form of online games could be designed in a similar manner to facilitate patterns of multitasking.



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**Distributed Cognition — the ability to interact meaningfully with tools that expand our mental capacities.**

Challenging the traditional view that intelligence is an attribute of individuals, the distributed cognition perspective holds that intelligence is distributed across “brain, body, and world” (Clark, 1997), looping through an extended technological and sociocultural environment (Clark, 2003). Explaining this idea, Pea (1997) notes, “When I say that intelligence is distributed, I mean that the resources that shape and enable activity are distributed in configurations across people, environments, and situations. In other words, intelligence is accomplished rather than possessed” (p. 50). Work in distributed cognition focuses on forms of reasoning that would not be possible without the presence of artifacts or information appliances and that expand and augment human’s cognitive capacities. These devices might be forms that externalize memory, such as a database, or they can be devices that externalize processes (Shaffer & Kaput, 1999), such as the widely used spell checker. The more we rely on the capacities of technologies as a part of our work, the more it may seem that cognition is distributed.

Teachers have long encouraged students to bring scratch paper with them into math examinations, realizing that the ability to construct representations and record processes was vital in solving complex problems. If, as Clark (2003) notes, technologies are inextricably interwoven with thinking, it makes no sense to “factor out” what the human brain is doing as the “real” part of thinking, and to view what the technology is doing as a “cheat” or “crutch.” Rather, we can understand cognitive activity as shared among a number of people and artifacts, and cognitive acts as learning to think with other people and artifacts. Following this theory, students need to know how to think with and through their tools as much as they need to record information in their heads.

Gamers may be acquiring some of these distributed cognition skills through their participation in squadron-based video games. Gee (2003) suggests that in playing such games, one must form a mental map of what player and nonplayer characters are doing (nonplayer characters are characters controlled by the A.I of the game). To plan appropriately, players may not need to know what other participants know, but they do need to know what it is those participants are likely to do. Moreover, in playing the games, one may need to flip through a range of different representations of the state of the game world and of the actions that are occurring within it. Learning to play involves learning to navigate this information environment, understanding the value of each representational technology, knowing when to consult each and how to deploy this knowledge to reshape what is occurring. Instead of thinking as an autonomous problem-solver, the player becomes part of a social and technological system that is generating and deploying information at a rapid pace. Humans are able to play much more complex games (and to solve much more complex problems) in a world in which keeping track of key data and enacting well-understood computational processes can be trusted to the processing power of the computer, and they can thus focus more attention on strategic decision making.

Distributed cognition is not simply about technologies; it is also about tapping social institutions and practices or remote experts whose knowledge may be useful in solving a particular problem. According to this understanding, expertise comes in many shapes and sizes (both



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human and non-human). Experts can be expert practitioners, who can be consulted through such technologies as video conferencing, instant messaging, or email; some knowledge can emerge from technologies such as calculators, spread sheets, and expert systems; new insights can originate from the teacher or students or both. The key is having expertise somewhere within the distributed learning environment and making sure students understand how to access and deploy it.

Applications of the distributed cognition perspective to education suggest that students must learn the affordances of different tools and information technologies, and know which functions tools and technologies excel at and in what contexts they can be trusted. Students need to acquire patterns of thought that regularly cycle through available sources of information as they make sense of developments in the world around them. Distributed intelligence is not simply a technical skill, although it depends on knowing how to use tools effectively; it is also a cognitive skill, which involves thinking across “brain, body, and world.” The term “distributed intelligence” emphasizes the role that technologies play in this process, but it is closely related to the social production of knowledge that we are calling collective intelligence.

### **What Might Be Done**

The theory of distributed cognition informs educational research and practice when it provides a perspective for envisioning new learning contexts, tools, curricula and pedagogy, participant structures, and goals for schooling.

- Augmented reality games represent one potential application of distributed intelligence to the learning process. Klopfer and Squire (2005) developed a range of games in which students use location-aware, GPS-enabled handheld computers to solve fictional problems in real spaces. For example, in *Environmental Detectives*, students determine the source of an imaginary chemical leak, which is causing environmental hazards on the MIT campus. Students can use their handhelds to drill imaginary wells and take readings on the soil conditions, but to do so, they must travel to the actual location. Data drawn from the computer is read against their actual physical surroundings—the distance between locations, the slope of the land, its proximity to the Charles River—and multiple players compare notes as they seek to resolve the game scenario.
- Students in the Comparative Media Studies Program have experimented with the use of handhelds to allow tourists to access old photographs of historic neighborhoods and compare them with what they are seeing on location (Jenkins, 2004a). Elsewhere, students travel across the battlefield at Lexington conducting interviews with historical personage to better understand their perspective on what happened there in 1775 (Shrier, 2005). In each case, direct perceptions of the real world and information drawn from information appliances are mutually reinforcing. The players combine multiple information sources in completing the tasks at hand.
- *Byline* (Hatfield & Shaffer, in press) is an Internet-based publishing and editing tool designed to focus attention on the organizational and structural features of journalism. By



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providing a space for the body of the story, the byline, and the lead, this “smart tool” scaffolds students’ processes of learning to write a journalistic story. By cueing students on what to write, where to write it, and even into such journalistic values as the need to catch the reader’s attention, this specially designed program helps students to learn the conventions and values of journalism.

- A classroom designed to foster distributed cognition encourages students to participate with a range of people, artifacts, and devices. The various forms of participation composing such cognitive activity might be understood more generally as the skill of *knowing how to act within distributed knowledge systems*. Interested in designing learning environments that would foster such a skill, Bell and Winn (2000) describe a classroom not only in which participation requires active collaborations with people and tools that are physically present, but also with people and tools that are virtually present through, for example, video conferencing with a science practitioner, using the web to connect to a database in Japan, and using Excel spreadsheets to simulate a mass spectrometer. In such classrooms, knowing how to act within the distributed knowledge system is more important than learning content. Because content is something that can be “held” by technologies such as databases, websites, wikis, and so forth, the curricular focus is on learning how to generate, evaluate, interpret, and deploy data.
- With new technologies, new cognitive possibilities arise. Educators need to create new activities when new technologies are introduced into the classroom. If the calculator is used to add 2+2, it is the capacities of the calculator that are solving the problem (Shaffer & Clinton, in press); when calculation is “off loaded” onto the calculator, the student is free to solve more complex problems. The proliferation of digital technologies requires a concerted effort to envision activities that enable students to engage in more complex problem domains. For example, as a vehicle for assessing the various ways ecommerce affects the environment, students could be given the problem of comparing the environmental impact of shipping 250,000 copies of *Harry Potter and the Goblet of Fire* directly to individual customers rather than to bookstores. Reflecting on the intended outcome for such a comparison, Yagelski notes, “The click of the computer mouse to order a copy of *Harry Potter* from Amazon.com can seem a simple and almost natural act, yet it represents participation in this bewilderingly complex web of material connections that is anything but simple. And that participation contributes to the condition of our planet.” See <http://english.ttu.edu/kairos/6.2/features/yagelski/crisis.htm>.

### **Collective Intelligence — the ability to pool knowledge and compare notes with others towards a common goal**

As users learn to exploit the potential of networked communication, they participate in a process that Levy (2000) calls “collective intelligence.” Like-minded individuals gather online to embrace common enterprises, which often involve access and processing information. In such a world, Levy argues, everyone knows something, nobody knows everything, and what any one person knows can be tapped by the group as a whole. We are still experimenting with how to work within these knowledge cultures and what they can accomplish when we pool knowl-



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edge. Levy argues that as a society, we are currently at an apprenticeship phase, during which we try out and refine skills and institutions that will sustain the social production of knowledge. Levy sees collective intelligence as an alternative source of power, one that allows grassroots communities to respond effectively to government institutions that emerge from the

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***“Collective intelligence”...***

***In such a world, everyone knows something, nobody knows everything, and what any one person knows can be tapped by the group as a whole.***

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nation state or to corporate interests that sustain multinational commerce. Already, we are seeing governments and industries seek ways to “harness collective intelligence,” which has become the driving force behind what people are calling Web 2.0.

Currently, children and adults are acquiring the skills to operate within knowledge communities by interacting with popular culture. As has often been the case, we learn through play that we later apply to more serious tasks. So, for example, the young

Pokémon fans, who each know some crucial detail about the various species, constitute a collective intelligence whose knowledge is extended each time two youth on the playground share something about the franchise.

Such knowledge sharing can assume more sophisticated functions as it moves online. For example, Matrix fans have created elaborate guides which help them track information about the fictional Zion resistance movement featured in the film. Young people are playing with collective intelligence as they participate in the vast knowledge communities that emerged from the online game *I Love Bees*. Some estimate that as many as 3 million players participated in history’s most challenging scavenger hunt. After working through puzzles so complicated they mandated the effective collaboration of massive numbers of people with expertise across a variety of domains and geographic locations, players gathered clues by answering more than 40,000 payphone calls across all 50 U.S. states and eight countries (McGonigal, 2005). They then fed those clues back into online tools designed to support large-scale collaboration for all players to deconstruct and analyze. If players were unfamiliar with how to participate in the community, other players would train them in the necessary skills. In another example, fans of the television show *Survivor* have used the Internet to track down information and identify the names of contestants before they are announced by the network. They have also used satellite photographs to identify the location of the Survivor base camp despite the producer’s “no fly over” agreements with local governments. These knowledge communities change the very nature of media consumption—a shift from the personalized media that was central to the idea of the digital revolution toward socialized or communalized media that is central to the culture of media convergence (H. Jenkins, 2006a).

As players learn to work and play in such knowledge cultures, they come to think of problem-solving as an exercise in teamwork. Consider the following postings made by members of The Cloudmakers, a team formed in a game similar to *I Love Bee’s* (McGonigal, 2003, p. 7):

The solutions do not lie in the puzzles we are presented with, they lie in the connections we make, between the ideas and between one another. These are what will last. I look down at myself and see that I, too, have been incorporated into the whole, connections flowing to me and from me, ideas flowing freely as we work together, as individuals and as



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a group, to solve the challenges we are presented with. The solution, however, does not lie in the story. We are the solution.

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The 7500+ people in this group ... we are all one. We have made manifest the idea of an unbelievably intricate intelligence. We are one mind, one voice ... made of 7500+ neurons... We are not one person secluded from the rest of the world... We have become a part of something greater than ourselves.

Indeed, these groups have been drawn from playing games to confronting real-world social problems, such as tracking campaign finances or trying to solve local crimes, as they develop a new sense of self-confidence in their ability to tackle challenges collectively, challenges that, as individuals, they would be unable to face.

This focus on teamwork and collaboration is also, not coincidentally, how the modern workplace is structured—around ad-hoc configurations of employees, brought together because their diverse skills and knowledge are needed to confront a specific challenge, then dispersed into different clusters of workers when new needs arise. Doctorow (2005) has called such systems “ad-hocracies,” suggesting that they contrast in every possible way with prior hierarchies and bureaucracies. Our schools do an excellent job, consciously or unconsciously, teaching youth how to function within bureaucracies. They do almost nothing to help youth learn how to operate within an ad-hocracy.

Collective intelligence is increasingly shaping how we respond to real-world problems. On August 29, 2005, Hurricane Katrina tore apart the levee that protected New Orleans from Lake Pontchartrain and the Mississippi River. Not only was the ability of ordinary citizens to share self-produced media and information pivotal in shaping the view of the situation for the outside world (thereby bringing in more relief funds), but it allowed for those affected by the disaster to effectively assist one another. After Jonathan Mendez’s parents evacuated from Louisiana to his home in Austin, Texas, he was eager to find out if the floods had destroyed their home in Louisiana. Unfortunately for him, media coverage of the event was focused exclusively on the most devastated parts of New Orleans, with little information about the neighborhood where his parents lived. With some help from his coworker, they were able, within a matter of hours, to modify the popular “Google maps” web service to allow users to overlay any information they had about the devastation directly onto a satellite map of New Orleans. Shortly after making their modification public, more than 14,000 submissions covered their map. This allowed victims scattered throughout the United States to find information about any specific location—including verifying that the Mendez’s house was still intact (Singel, 2005).

Unfortunately, most contemporary education focuses on training autonomous problem solvers and is not well suited to equip students with these skills. Whereas a collective intelligence community encourages ownership of work as a group, schools grade individuals. Whereas Jonathan Mendez was admired for having appropriated Google’s mapping web service, students in school are often asked to swear that what they turn in is their “own work.”



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Leadership within a knowledge community requires the ability to identify specific functions for each member of the team based on his or her expertise and to interact with the team members in an appropriate fashion. Teamwork involves a high degree of interdiscipline—the ability to reconfigure knowledge across traditional categories of expertise. In early February 2004, Eric Klopfer (Atwood, 2004), an MIT professor of urban studies and planning, along with a team of researchers from the Education Arcade, conducted “a Hi-Tech Who Done It” for middle-school youth and their parents inside the Boston Museum of Science. Teams of three adult-child pairs were given handhelds to search for clues of the whereabouts and identity of the notorious Pink Flamingo Gang, who had stolen an artifact and substituted a fake in its place. Thanks to museum’s newly installed wi-fi network and the players’ location-aware handhelds, each gallery offered the opportunity to interview cyber-suspects, download objects, examine them with virtual equipment, and trade their findings. Each parent-child unit was assigned a different role—biologists, detectives, or technologists—enabling them to use different tools on the evidence they gathered. This is simply one of many recent cooperative games that assigned distinct roles to each player, giving each access to a different set of information, and thus creating strong incentives for them to pool resources.

Schools, on the other hand, often seek to develop generalists rather than allowing students to assume different roles based on their emerging expertise. The ideal of the Renaissance man was someone who knew everything or at least knew a great deal about a range of different topics. The ideal of a collective intelligence is a community that knows everything and individuals who know how to tap the community to acquire knowledge on a just-in-time basis. Minimally, schools should be teaching students to thrive in both worlds: having a broad background on a range of topics, but also knowing when they should turn to a larger community for relevant expertise. They must know how to solve problems on their own but also how to expand their intellectual capacity by working on a problem within a social community. To be a meaningful participant in such a knowledge culture, students must acquire greater skills at assessing the reliability of information, which may come from multiple sources, some of which are governed by traditional gatekeepers, others of which must be crosschecked and vetted within a collective intelligence.

### **What Might Be Done**

Schools can deploy aspects of collective intelligence when students pool observations and work through interpretations with others studying the same problems at scattered locations. Such knowledge communities can confront problems of greater scale and complexity than any given student might be able to handle.

- Scientists in fields requiring simple, yet extensive, data analysis tasks could partner with junior high teachers to have students help collect or analyze real data. Eelgrass is both the most abundant seagrass in Massachusetts and one of the most ecologically valuable marine and estuarine habitats in North American coastal waters. The MIT Sea Grant College Program developed a project where students in different schools learn to cultivate eelgrass and collaboratively share data regarding the levels of nitrates, oxygen, and so forth in affected habitats through the project website: <http://seagrantdev.mit.edu/eelgrass/>



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- Sites such as *ning.com* offers nonprogrammers tools for rapidly creating social web applications that allow users to interact with and share information with one another. For example, a Mandarin teacher could easily create an online travel guide in which students (potentially nationwide) would each contribute write-ups of interesting sites in their local areas that would be of interest to visitors from China.
  - Students taking civic classes might be encouraged to map their local governments using a Wikipedia-like program, bringing together names of government officials, reports on government meetings, and key policy debates. The information would be accessible to others in their own communities. They might also compare notes with students living in other parts of the country to identify policy alternatives that might address problems or concerns in their communities.

### **Judgment — the ability to evaluate the reliability and credibility of different information sources**

Although it is exciting to see players harness collective intelligence to successfully solve problems of unprecedented complexity, this process also involves a large number of errors. Misinformation emerges, is worked over, refined or dismissed before a new consensus emerges. We are taught to think of knowledge as a product, but within a collective intelligence, knowledge is also always in process. As such, one must understand where one is in the vetting process to know how much trust to place in any given piece of information. In a game such as *I Love Bees*, these mistakes are generally of little consequence and often serve as a source of amusement than anything else. As these same technologies are employed in understanding world events, we must better understand the strengths and limitations of these new practices of knowledge production.

For example, one key technology in online collective intelligence communities is a wiki. Although it may be possible for a small group of individuals to contribute erroneous information, wiki enthusiasts argue that giving all members of a larger community the ability to correct any mistakes will ultimately lead to more accurate information. In many cases, this concept has proved surprisingly effective. In one study (Giles, 2005), *Nature* magazine compared the accuracy of articles in *Wikipedia*, an enormous online encyclopedia constructed entirely through the efforts of volunteers using wiki technologies, with equivalent articles in *Encyclopedia Britannica*. They concluded the accuracy levels of the two to be roughly the same. (This wasn't because *Wikipedia* was flawless, but rather because even sources such as *Encyclopedia Britannica* are flawed). Students must be taught to read both sources from a critical perspective.

The *Nature* article also identifies that wikis perform best when a large number of participants are actively using the technology to correct mistakes. Whereas the *Wikipedia* article on global warming enjoys more than 10,000 authors, each passionately committed to ensuring the accuracy of its content, the biographical article on John Seigenthaler cited him as having a possible involvement in the assassinations of Robert F. Kennedy and John F. Kennedy for a period of 132 days before someone corrected it (Seigenthaler, 2005). Given the disparity in the accuracy of different articles, students need to develop an intuitive understanding of how the contents of



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a wiki are produced by participating in their construction, and then actively reflecting on the different possibilities for inaccuracies.

In truth, schools should always teach students critical thinking skills for “sussing out” the quality of information, yet historically schools have had a tendency to fall back on the gatekeeping functions of professional editors and journalists, not to mention of textbook selection committee and librarians, to ensure that the information is generally reliable. Once students enter cyberspace, where anyone can post anything, they need skills in evaluating the quality of different sources, how perspectives and interests can color representations, and the likely mechanisms by which misinformation is perpetuated or corrected. We need to balance a trust of traditional gatekeeping organizations (Public Television, Smithsonian, National Geographic, for example) with the self-correcting potential of grassroots knowledge communities. Traditional logic would suggest, for example, that *60 Minutes*, a long-standing network news show, would be more

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accurate than a partisan blog, but in fall 2004, bloggers working together recognized flaws in the evidence that had been vetted by the established news agency. As Gillmore (2004) notes, we are entering a world in which citizen journalists often challenge and sometimes correct the work of established journalists, even as journalists debunk the urban folklore circulated in the blogging community.

Misinformation abounds online, but so do mechanisms for self-correction. In such a world, we can only trust established institutions so far. We all must learn how to read one source of information against another; to understand the contexts within which information is produced and circulated; to identify the mechanisms that ensure the accuracy of information as well as realizing under which circumstances those mechanisms work

best. Confronted with a world in which information is unreliable, many of us fall back on cynicism, distrusting everything we read. Rather, we should foster a climate of healthy skepticism, in which all truth claims are weighed carefully, but there is an ethical commitment to identifying and reporting the truth.

Students are theoretically taught in school how to critically assess the pros and cons of an argument. In an increasingly pervasive media environment, they also must be able to recognize when arguments are not explicitly identified as such. The new mediated landscape of mainstream news sources, collaborative blog projects, unsourced news sites, and increasingly sophisticated marketing techniques aimed at ever-younger consumers demand that students be taught how to distinguish fact from fiction, argument from documentation, real from fake, and marketing from enlightenment.

“To be a functioning adult in a mediated society, one needs to be able to distinguish between different media forms and know how to ask basic questions about everything we watch, read, or hear,” says Thoman and Jolls (2005). “Although most adults learned through English classes to distinguish a poem from an essay, it is amazing how many people do not understand the difference



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between a daily newspaper and a supermarket tabloid, what makes one website legitimate and another one a hoax, or how advertisers package products to entice us to buy” (p. 182).

Even when media content has been determined credible, it is vital for students to also identify and analyze the perspective of the producer: who is presenting what to whom, and why. Existing media literacy materials excel in examining the forces behind controversial media properties, particularly provocative visuals, its intentions, and effects.

As Buckingham (2005) notes, children may lack some of the core life experiences and basic knowledge that might help them to discriminate between accurate and inaccurate accounts:

[T]here is as yet relatively little research about how children make judgements about the reliability of information on the Internet, or how they learn to deal with unwelcome or potentially upsetting content. Children may have more experience of these media than many adults, but they mostly lack the real-world experience with which media representations can be compared; and this may make it harder for them to detect inaccuracy and bias” (p. 22).

Reviewing the literature on how children make sense of online resources, Buckingham finds that students lack both knowledge and interest in assessing how information was produced for and within digital environments: “Digital content was ‘often seen as originating not from people, organisations, and businesses with particular cultural inclinations or objectives, but as a universal repository that simply existed ‘out there’” (Facer et al., 2003, in Buckingham, 2005, p. 18). Other studies find that children remain unaware of the motives behind the creation of websites, have difficulty separating commercial from noncommercial sites, and lack the background to identify the sources of authority behind claims made by website authors.

As this discussion has suggested, judgment might be seen as part of our existing conception of literacy—a core research skill of the kind that has long been fundamental to the school curriculum. Yet, this discussion also underscores that judgment operates differently in an era of distributed cognition and collective intelligence. Judgment requires not simply logic, but also an understanding of how different media institutions and cultural communities operate. Judgment works not simply on knowledge as the product of traditional expertise, but also on the process by which grassroots communities work together to generate and authenticate new information.

### **What Might Be Done**

Judgment has long been the focus of media literacy education in the United States and around the world as students are encouraged to ask critical questions about the information they are consuming.

- The Boston-based Youth Voice Collaborative has developed an exercise that gives students a range of news stories and asks them to rank the stories according to traditional news standards. The process is designed to encourage students to understand what criteria jour-



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nalists use to determine the “news value” of different events and to encourage students to express their own priorities about what information matters to them and why.

- <http://news.google.com> aggregates articles from thousands of news sources worldwide. This allows users to compare and contrast the framing of a single issue from different media sources. Students are encouraged to read several articles closely, underlining words they believe might shape how readers understand and feel about what they are reading.
- The New Media Literacies project at MIT has developed a set of activities to involve students in understanding how representations of “truth” and “fiction” vary in different media forms and, therefore, how different techniques must be learned, and choices must be made, when seeking to manipulate meanings by altering representations. For example, in an image manipulation activity, students search for an image of an event (such as the March on Washington, the Kennedy assassination) and are taught how to change the picture in a way that changes the meaning. By manipulating images, students become familiar with the ways images may be altered to persuade and influence. In developing this manipulation skill, students are encouraged to think about why image, sound, and textual representations are altered and what that means to them as consumers, voters, and citizens.
- A growing number of teachers are using the Talk Pages for contested *Wikipedia* entries as illustrations of the types of questions one might want to ask about any information and the processes and criteria by which disputes about knowledge might be resolved.
- Tools such as *lijit.com* allow readers of a website to alert friends who subsequently read the same website that its content may be suspect. Students might also be encouraged to take advantage of sites such as *snopes.com*, which regularly report on frauds and misinformation circulating online and provide good illustrations of the ways that one could test the credibility of information

### **Transmedia Navigation — the ability to deal with the flow of stories and information across multiple modalities**

In an era of convergence, consumers become hunters and gatherers pulling together information from multiple sources to form a new synthesis (H. Jenkins, 2006a). Storytellers exploit this potential for transmedia storytelling; advertisers talk about branding as depending on multiple touch points; networks seek to exploit their intellectual properties across many different channels. As they do so, we encounter the same information, the same stories, the same characters and worlds across multiple modes of representation. Transmedia stories at the most basic level are stories told across multiple media. At the present time, the most significant stories tend to flow across multiple media platforms.

Consider, for example, the Pokémon phenomenon. As Buckingham and Sefton-Green (2004) explain, “Pokémon is something you do, not just something you read or watch or consume.” Several hundred different Pokémon exist, each with multiple evolutionary forms and a complex set of rivalries and attachments. There is no one text for information about these various



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species. Rather, the child assembles information from various media, with the result that each child knows something his or her friends do not. As a result, the child can share his or her expertise with others. As Buckingham and Sefton-Green explain, “Children may watch the television cartoon, for example, as a way of gathering knowledge that they can later utilize in playing the computer game or in trading cards, and vice versa. The fact that information can be transferred between media (or platforms) of course adds to the sense that Pokémon is unavoidable. In order to be a master, it is necessary to ‘catch’ all its various manifestations” (p. 22).

Such information feeds back into social interactions (Ito, 2005b), including face-to-face contact within local communities and mediated contact online with a more dispersed population. These children’s properties offer multiple points of entry, enable many different forms of participation, and facilitate the interests of multiple consumers.

One dimension of this phenomenon points us back to collective intelligence, given that what Ito calls “hypersociability” emerges as children trade notes and exchange artifacts associated with their favorite television shows. A second dimension of this phenomenon points us to what Kress (2003) calls multimodality. Consider a simple example. The same character (say, Spider-Man) may look different when featured in an animated video than in a video game, or a printed comic book, or as a molded plastic action figure, or in a live-action movie. How then do readers learn to recognize this character across all of these different media? How do they link what they have learned about the character in one context to what they learned in a completely different media channel? How do they determine which of these representations are linked (part of the same interpretation of the character) and which are separate (separate versions of the character that are meant to be understood autonomously)? These are the kinds of conceptual problems youth encounter regularly in their participation in contemporary media franchises.

Kress (2003) stresses that modern literacy requires the ability to express ideas across a broad range of different systems of representation and signification (including “words, spoken or written; image, still and moving; musical...3D models...”). Each medium has its own affordances, its own systems of representation, its own strategies for producing and organizing knowledge. Participants in the new media landscape learn to navigate these different and sometimes conflicting modes of representation and to make meaningful choices about the best ways to express their ideas in each context. All of this sounds more complicated than it is. As the New Media Consortium’s 2005 report on twenty-first century literacy suggests, “Young people adept at interpreting meaning in sound, music, still and moving images, and interactive components not only seem quite able to cope with messages that engage several of these pathways at once, but in many cases prefer them” (online source).

Kress argues that this tendency toward multimodality changes how we teach composition, because students must learn to sort through a range of different possible modes of expression, determine which is most effective in reaching their audience and communicating their message, and to grasp which techniques work best in conveying information through this channel. Kress advocates moving beyond teaching written composition to teaching design literacy as the basic expressive competency of the modern era. This shift does not displace printed texts with



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images, as some advocates of visual literacy have suggested. Rather, it develops a more complex vocabulary for communicating ideas that requires students to be equally adept at reading and writing through images, texts, sounds, and simulations. The filmmaker George Lucas (Daly, 2004, online source/no page number) offers an equally expansive understanding of what literacy might mean today:

We must teach communication comprehensively in all its forms. Today we work with the written or spoken word as the primary form of communication. But we also need to understand the importance of graphics, music, and cinema, which are just as powerful and in some ways more deeply intertwined with young people's culture. We live and work in a visually sophisticated world, so we must be sophisticated in using all the forms of communication, not just the written word.

In short, new media literacies involve the ability to think across media, whether understood at the level of simple recognition (identifying the same content as it is translated across different modes of representation), or at the level of narrative logic (understanding the connections between story communicated through different media), or at the level of rhetoric (learning to express an idea within a single medium or across the media spectrum). Transmedia navigation involves both processing new types of stories and arguments that are emerging within a convergence culture and expressing ideas in ways that exploit the opportunities and affordances represented by the new media landscape. In other words, it involves the ability to both read and write across all available modes of expression.

### **What Might Be Done**

Students learn about multimodality and transmedia navigation when they take time to focus on how stories change as they move across different contexts of production and reception, as they give consideration to the affordances and conventions of different media, and as they learn to create using a range of different media tools.

- Students in literature classes are asked to take a familiar fairy tale, myth, or legend and identify how this story has been retold across different media, different historical periods, and different national contexts. Students search for recurring elements as well as signs of the changes that occur as the story are retold in a new context.
- French language students in New York recreate characters from various French literary works in the best-selling video game *The Sims 2*. Students then tell new stories by playing out the interactions between different characters inside the game world. Characters are projected onto a screen in front of the class for students to do live performances with their characters. see <http://www.mylenecatel.com>
- An exercise developed by MIT's New Media Literacies (Jenkins, 2006b) asks students to tell the same story across a range of different media. For example, they script dialogue using instant messenger; they storyboard using Powerpoint and images appropriated from the Internet; they might later reenact their story and record it using a camera or video



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camera; they might illustrate it by drawing pictures. As they do so, they are encouraged to think about what each new tool contributes to their overall experience of the story as well as what needs to remain the same for viewers to recognize the same characters and situations across these various media.

### **Networking — the ability to search for, synthesize, and disseminate information**

In a world in which knowledge production is collective and communication occurs across an array of different media, the capacity to network emerges as a core social skill and cultural competency. A resourceful student is no longer one who personally possesses a wide palette of resources and information from which to choose, but rather, one who is able to successfully navigate an already abundant and continually changing world of information. Increasingly, students achieve this by tapping into a myriad of socially based search systems, including the following popular sites.

- **Google.com:** At the core of the now ubiquitous Google search engine is an algorithm that analyzes the links between websites to measure which sites different website creators consider valuable or relevant to particular topics.
- **Amazon.com:** Suggests books a customer may like on the basis of patterns gleaned from analyzing similar customers.
- **Movielens.org:** Predicts if a particular user will like a given movie based on preferences from similar users.
- **Ebay.com:** Creates a complex reputation system between users to establish trust for a given seller.
- **Epinions.com:** Establishes reliability of a given product on the basis of previous consumer experiences
- **last.fm:** Generates personalized radio stations on the basis of correlations between similar listeners' music preferences.
- **Del.icio.us:** Suggests relevant websites for a given term on the basis of other users' bookmarking habits
- **Answers.google.com:** Offers a mass collective-intelligence marketplace in which users can offer money to anyone worldwide who may have answers to their questions.
- **Citeulike.org:** Academic citation manager that both helps users locate relevant articles on the basis of other users' citation management and allows users to flag important information about given articles, such as inaccuracies.



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- **Getoutfoxed.com:** Allows trusted friends and users to provide annotations and meta-discussion about a given website that a user might be browsing, such as warnings about inaccurate content.
  - **RSS:** Intelligently aggregates and consolidates content produced by friends and trusted sources to help efficiently share resources across networks.

Business guru Tim O'Reilly has coined the term, "Web 2.0" to refer to how the value of these new networks depends not on the hardware or the content, but on how they tap the participation of large-scale social communities, who become invested in collecting and annotating data for other users. Some of these platforms require the active participation of consumers, relying on a social ethos based on knowledge-sharing. Others depend on automated analysis of collective behavior. In both cases, though, the value of the information depends on one's understanding of how it is generated and one's analysis of the social and psychological factors that shape collective behavior.

In such a world, students can no longer rely on expert gatekeepers to tell them what is worth knowing. Instead, they must become more reflective of how individuals know what they know and how they assess the motives and knowledge of different communities. Students must be able to identify which group is most aware of relevant resources and choose a search system matched to the appropriate criteria: people with similar tastes; similar viewpoints; divergent viewpoints; similar goals; general popularity; trusted, unbiased, third-party assessment, and so forth. If transmedia navigation involves learning to understand the relations between different media systems, networking involves the ability to navigate across different social communities.

Schools are beginning to teach youth how to search out valuable resources through such activities as "webquests." In the last ten years, webquests, that is, activities designed by teachers "in which some or all of the information that learners interact with comes from resources on the Internet" (Dodge, 1997), have exploded in popularity. In a typical webquest, students are given a scenario that requires them to extract information or images from a series of websites and then compile their findings into a final report. For example, students might be told they are part of a team of experts brought in to determine the most appropriate method for disposing of a canister of nuclear waste. They are provided a series of websites relevant to waste disposal and asked to present a final proposal to the teacher. For many educators, webquests provide a practical means for using new media to broaden students' exposure to different perspectives and provide fresh curricular materials. Rather than requiring textbook authors to develop "neutral" accounts of facts, teachers develop and share webquests by simply referencing existing web content. This both exposes students to a variety of opinions and trains them to synthesize their own perspectives. Yet, critics argue that most existing webquests fall short of fully exploiting the potential of social networks--both in terms of teaching students how to exploit networking to track down information and in terms of using networks to distribute the byproducts of their research.

Networking is only partially about identifying potential resources; it also involves a process of synthesis, during which multiple resources are combined to produce new knowledge. In discussing "The Wisdom of Crowds," Surowiecki (2004, online source/no page numbers)



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describes the conditions needed to receive the maximum benefit from collective intelligence:

There are four key qualities that make a crowd smart. It needs to be diverse, so that people are bringing different pieces of information to the table. It needs to be decentralized, so that no one at the top is dictating the crowd's answer. It needs a way of summarizing people's opinions into one collective verdict. And the people in the crowd need to be independent, so that they pay attention mostly to their own information, and not worrying about what everyone around them thinks.

Because new research processes depend on young people's resourcefulness as networkers, students must understand how to sample and distill multiple, independent perspectives. Guinee and Eagleton (2006) have been researching how students take notes in the digital environment, discovering, to their dismay, that young people tend to copy large blocks of text rather than paraphrasing it for future reference. In the process, they often lose track of the distinction between their own words and material borrowed from other sources. They also skip over the need to assess any contradictions that might exist in the information they have copied. In short, they show only a minimal ability to create a meaningful synthesis from the resources they have gathered.

Networking also implies the ability to effectively tap social networks to disperse one's own ideas and media products. Many youth are creating independent media productions, but only some learn how to be heard by large audiences. Increasingly, young artists (Bertozzi and Jenkins, forthcoming) are tapping networks of fans or gamers with the goal of reaching a broader readership for their work. They create within existing cultural communities not because they were inspired by a particular media property, but because they want to reach that property's audience of loyal consumers. Young people are learning to link their websites together into web-rings in part to increase the visibility of any given site and also to increase the profile of the group. Teachers are finding that students are often more motivated if they can share what they create with a larger community. As students make their work accessible to a larger public, they face public consequences for what they write and, thus, they face the kind of ethical dilemmas we identified earlier in this document.

At the present time, social networking software is under fire from adult authorities, and federal law makes it more difficult to access and deploy these tools in the classroom. Yet, we would argue that schools have a different obligation—to help all children learn to use such tools effectively and to understand the value of networking as a means of acquiring knowledge and distributing information. Learning in a networked society involves understanding how networks work and how to deploy them for one's own ends. It involves understanding the social and cultural contexts within which different information emerges, when to trust and when not to trust others to filter and prioritize relevant data, and how to use networks to get one's own work out into the world and in front of a relevant and, with hope, appreciative public.

### **What Might Be Done**

Educators take advantage of social networking when they link learners with others who might share their interests or when they encourage students to publish works produced to a larger public.



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- Noel Jenkins (2006), a British junior high teacher, created a geography unit in which he asks students to play the roles of city planners determining the most appropriate location for a new hospital in San Francisco. First, students familiarize themselves with the city layout by exploring satellites imagery of the city, navigating through three-dimensional maps and watching webcam streams from different parts of the city. Next, students are shown how to layer the data most relevant to their decision atop their city maps. Finally, students are asked to decide on a final location for their hospital and illustrate their maps with annotations justifying their decision. See <http://www.juicygeography.co.uk/googleearthsanfran.htm>
  - Students use online storefront services such as [cafePress.com](http://cafePress.com) and [zazzle.com](http://zazzle.com) to share their artistic creations and personal hobbies with the general public. In many cases, young entrepreneurs are able to make up to \$18,000 per year doing so (Barbour, 2006).
  - Educational Technology enthusiast Will Richardson used the community news application *crispynews.com* to create *edbloggernews.crispynews.com*, an online nexus for teachers to share educational resources with one another. Each participant helps to rank the different curricular suggestions using collaborative filtering technologies.
  - Students at Grandview Elementary School publish an online newspaper and podcast their works. See <http://www.grandviewlibrary.org/Fold/GrandviewNews.aspx>
  - Outraged by a House bill that would make illegal immigration a felony, more than 15,000 high school students in Los Angeles staged a protest coordinated primarily through Myspace.

### **Negotiation — the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative sets of norms**

The fluid communication within the new media environment brings together groups who otherwise might have lived segregated lives. Culture flows easily from one community to another. People online encounter conflicting values and assumptions, come to grips with competing claims about the meanings of shared artifacts and experiences. Everything about this process ensures that we will be provoked by cultural difference. Little about this process ensures that we will develop an understanding of the contexts within which these different cultural communities operate. When white suburban youth consume hip hop or Western youth consume Japanese manga, new kinds of cultural understanding can emerge. Yet, just as often, the new experiences are read through existing prejudices and assumptions. Culture travels easily, but the individuals who initially produced and consumed such culture are not always welcome everywhere it circulates.

Cyber communities often bring together groups that would have no direct contact in the physical world, resulting in heated conflicts about values or norms. Increasingly, critics are focusing on attempts to segregate membership or participation within online social groups.



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The massively multiplayer game *World of Warcraft* has faced controversies about whether the formation of groups for gay, lesbian, and bisexual players increased or decreased the likelihood of sexual harassment or whether the formation of groups based on English competency reflected the importance of communication skills in games or constituted a form of discrimination motivated by stereotypes about the ethics and actions of Asian players. The social networking software that has become so central to youth culture can function as a vehicle for expressing and strengthening a sense of affiliation, but it can also be deployed as a weapon of exclusion and, as a consequence, a tool for enforcing conformity to peer expectations.

In such a world, it becomes increasingly critical to help students acquire skills in understanding multiple perspectives, respecting and even embracing diversity of views, understanding a variety of social norms, and negotiating between conflicting opinions. Traditionally, media literacy has addressed these concerns by teaching children to read through media-constructed stereotypes about race, class, sex, ethnic, religious, and other forms of cultural differences. Such work remains valuable in that it helps students to understand the preconceptions that may shape their interactions, but it takes on added importance as young people themselves create media content, which may perpetuate stereotypes or contribute to misunderstandings. If, as writers such as Surowiecki (2004) and Levy (2000) suggest, the wisdom of the crowd depends on the opportunity for diverse and independent insights and other inputs, then these new knowledge cultures require participants to master new social skills that allow them to listen to and respond to a range of different perspectives. We are defining this skill negotiation in two ways: first, as the ability to negotiate between dissenting perspectives, and second, as the ability to negotiate through diverse communities.

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***It becomes increasingly critical to help students acquire skills in understanding multiple perspectives, respecting and even embracing diversity of views, understanding a variety of social norms, and negotiating between conflicting opinions.***

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differences: diversity of perspective is essential if the collective intelligence process is to work well. Rather, it helps us to appreciate and value differences in background, experience, and resources as contributing to a richer pool of knowledge.

The most meaningful interventions will start from a commitment to the process of deliberation and negotiation across differences. They depend on the development of skills in active listening and ethical principles designed to ensure mutual respect. Participants agree to some rules of conduct that allow them to talk through similarities and differences in perspective in ways that may allow for compromise, or at least agreeing to disagree. In either case, such an approach seems essential if we are going to learn to share knowledge and collaborate within an increasingly multicultural society. Such an approach does not ignore

## **What Might Be Done**

Educators can foster negotiation skills when they bring together groups from diverse backgrounds and provide them with resources and processes that insure careful listening and deeper communication.



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- Researchers at Stanford University's Center for Deliberative Democracy (Fishkin & Lushkin, 2004) have been experimenting with new forms of civic engagement that depend on bringing people together from multiple backgrounds, exposing them to a broad array of perspectives, encouraging them to closely examine underlying claims and the evidence to support them, and creating a context in which they can learn from one another. Their initial reports suggest that this process generates powerful new perspectives on complex public policy issues, which gain the support of all parties involved. For some participants, the process strengthens their commitment to core beliefs and values. For others, it creates a context in which they are more open to alternative points of view and are able to find middle-ground positions. The project's focus on the process of deliberation—and not simply on the outcome—represents a useful model to incorporate into the classroom. Rather than having traditional pro-con debates that depend on a fixed and adversarial relationship between participants, schools should focus more attention on group deliberation and decision-making processes and on mechanisms that ensure that all parties listen and learn from one another's arguments.
  - The *Cultura* project, developed by Furstenberg (2004), links students in classrooms in North America and France. In the first phases, they are asked to complete a series of sentences ("A good parent is someone who..."), address a series of questions ("What do you do if you see a mother strike a child in the grocery store?"), and define a range of core terms and concepts ("individualism"). The French students write in French, the American students in English, allowing both classes to practice their language skills and understand the links between linguistic and cultural practices. Students are then asked to compare the different ways that people living in different parts of the world responded to these questions, seeking insights into differences in values and lifestyles. For example, individualism in France is seen as a vice, equated with selfishness, whereas for Americans, individualism is seen as a virtue, closely linked with freedom. These interpretations unfold in online forums where students from both countries can respond to and critique attempts to characterize their attitudes. As the process continues, students are encouraged to upload their own media texts, which capture important aspects of their everyday lives, artifacts they believe speak to the larger cultural questions at the center of their discussions. In this way, they learn to see themselves and one another more clearly, and they come away with a greater appreciation of cultural difference.
  - Rev. Denis Haak of the Ransom Fellowship has developed a series of probing questions and exercises intended to help Christians work through their responses to popular culture (Jenkins, 2006). Rejecting a culture war rhetoric based on sharp divisions, these exercises are intended to help Christians to identify and preserve their own values even as they come to understand "what non-believers believe." The Discernment movement sees discussing popular culture as a means of making sense of competing and contradictory value systems that interact in contemporary society. For this process to work, the program encourages participants to learn how to "disagree agreeably," how to stake out competing positions without personalizing the conflict.



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- Schools historically have used the adversarial process of formal debate to encourage students to do research, construct arguments, and mobilize evidence. Yet, there is a danger that this process forces students to adopt fixed and opposing positions on complex problems. One might instead adopt a deliberative process in the classroom that encourages collaboration and discussion across different positions, and thus creates a context for opposing parties to learn from one another and reformulate their positions accordingly.
  - Sites such as *Wikipedia* and *Wikinews* include a tab labeled “discussion” above each article or news entry. Here readers can view or participate in an online discussion with people of different viewpoints to arrive at a neutral point-of-view framing of the issue to be displayed on the main page.

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***Literacy skills for the twenty-first century are skills that enable participation in the new communities emerging within a networked society. They enable students to exploit new simulation tools, information appliances, and social networks; they facilitate the exchange of information between diverse communities and the ability to move easily across different media platforms and social networks.***

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We began this discussion by suggesting that literacy in the twenty-first century be understood as a social rather than individual skill and that what students must acquire should be understood as skills and cultural competencies. Each of the skills we have identified above represents modes of thought, ways of processing information, and ways of interacting with others to produce and circulate knowledge. These are skills that enable participation in the new communities emerging within a networked society. They enable students to exploit new simulation tools, information appliances, and social networks; they facilitate the exchange of information between diverse communities and the ability to move easily across different media platforms and social networks. Many of the skills schools have been teaching all along, although the emergence of digital media creates new pressure on schools to prepare students for their future roles as citizens and workers. Others are skills that emerge from the affordances of these new communications technologies and the social communities and cultural practices that have grown up around them.



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## Who Should Respond? A Systemic Approach to Media Education

We have identified three core problems that should concern all of us who care about the development and well-being of American's young people:

- How do we ensure that every child has access to the skills and experiences needed to become a full participant in the social, cultural, economic, and political future of our society?
- How do we ensure that every child has the ability to articulate his or her understanding of the way that media shapes perceptions of the world?
- How do we ensure that every child has been socialized into the emerging ethical standards that will shape their practices as media makers and as participants within online communities?

We have also identified a set of core social skills and cultural competencies that young people should acquire if they are to be full, active, creative, and ethical participants in this emerging participatory culture:

- Play** — the capacity to experiment with your surroundings as a form of problem-solving
- Performance** — the ability to adopt alternative identities for the purpose of improvisation and discovery
- Simulation** — the ability to interpret and construct dynamic models of real world processes
- Appropriation** — the ability to meaningfully sample and remix media content
- Multitasking** — the ability to scan one's environment and shift focus as needed to salient details.
- Distributed Cognition** — the ability to interact meaningfully with tools that expand mental capacities
- Collective Intelligence** — the ability to pool knowledge and compare notes with others toward a common goal
- Judgment** — the ability to evaluate the reliability and credibility of different information sources
- Transmedia Navigation** — the ability to follow the flow of stories and information across multiple modalities
- Networking** — the ability to search for, synthesize, and disseminate information
- Negotiation** — the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

Some children are acquiring some of these skills through their participation in the informal learning communities that surround popular culture. Some teachers are incorporating some of these skills into their classroom instruction. Some afterschool programs are incorporating some of these skills into their activities. Yet, as the above qualifications suggest, the integration of these important social skills and cultural competencies remains haphazard at best. Media



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education is taking place for some youth across a variety of contexts, but it is not a central part of the educational experience of all students. Our goal for this report is to encourage greater reflection and public discussion on how we might incorporate these core principles systematically across curricula and across the divide between in-school and out-of-school activities. Such a systemic approach is needed if we are to close the participation gap, confront the transparency problem, and help young people work through the ethical dilemmas they face in their everyday lives. Such a systemic approach is needed if children are to acquire the core social skills and cultural competencies needed in a modern era.

## **Schools**

In the above descriptions of core social skills and cultural competencies, we have spotlighted a range of existing classroom practices that help children become fuller participants in the new media landscape: the use of educational simulations, alternative and augmented reality games, webquests, production activities, blogs and wikis, and deliberation exercises. Such exercises involve actively applying new techniques of knowledge production and community participation to the existing range of academic subjects in the established school curriculum. We have seen how history classes are making use of educational games, how science classes are teaching youth to evaluate and construct simulations, how literature classes are embracing role play and appropriation, how math classes might explore the value of distributed cognition, and how foreign language classes are bridging cultural differences via networking. As these examples suggest, many individual schools and educators are experimenting with new media technologies and the processes of collaboration, networking, appropriation, participation, and expression that they enable. They are engaging students in real-world inquiries that require them to search out information, interview experts, connect with other students around the world, generate and share multimedia, assess digital documents, write for authentic audiences, and otherwise exploit the resources of the new participatory culture.

We see this report as supporting these individual educators by encouraging a more systemic consideration of the place these skills should assume in pedagogical practice. We believe that these core social skills and cultural competencies have implications across the school curriculum, with each teacher assuming responsibility for helping students develop the skills necessary for participation within their discipline. Clearly, more discipline-specific research is needed to more fully understand the value and relevance of these skills to different aspects of the school curriculum. Skills that are already part of the professional practices of scientists, historians, artists, and policymakers can also help inform how we introduce students to these disciplines.

Much of the resistance to media literacy training springs from the sense that the school day is bursting at its seams, that we cannot cram in any new tasks without the instructional system breaking down altogether. For that reason, we do not want to see media literacy treated as an add-on subject. Rather, we should view its introduction as a paradigm shift, one that, like multiculturalism or globalization, reshapes how we teach every existing subject. Media change is affecting every aspect of our contemporary experience, and as a consequence, every school discipline needs to take responsibility for helping students to master the skills and knowledge they need to function in a hypermediated environment.



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## After School

Afterschool programs may encourage students to examine more directly their relationship to popular media and participatory culture. Afterschool programs may introduce core technical skills that students need to advance as media makers. In these more informal learning contexts, students may explore rich examples of existing media practice and develop a vocabulary for critically assessing work in these emerging fields. Students may also have more time to produce their own media and to reflect on their own production activities. The approach proposed here takes the best of several contemporary approaches to media education, fusing the critical skills and inquiry associated with media literacy with the production skills associated with the Computer Clubhouses, and adding to both a greater awareness of the politics and practice of participatory culture.

The media literacy movement emerged in response to the rise of mass media. Here, for example, is a classic definition of media literacy created by the Ontario Association for Media Literacy in 1989 (As quoted by Duncan, 2005, online source/no page numbers):

Media literacy is concerned with developing an informed and critical understanding of the nature of the mass media, the techniques used by them, and the impact of those techniques. It is education that aims to increase students' understanding and enjoyment of how the media work, how they produce meaning, how they are organized, and how they construct reality. Media literacy also aims to provide students with the ability to create media products.

Although some media literacy educators have instituted groundbreaking work on digital media, the bulk of presentations at national conferences are still focused on more traditional media — print, broadcast, cinema, popular music, advertising — which are assumed to exert the greatest influence on young people's lives.

Media literacy educators are not wrong to be concerned by the concentrated power of the media industry, but they must also realize that this is only part of a more complex picture. We live in a world in which media power is more concentrated than ever before and yet the ability of everyday people to produce and distribute media has never been more free. Existing media literacy materials give us a rich vocabulary for thinking about issues of representation, helping students to think critically about how the media frames perceptions of the world and reshapes experience according to its own codes and conventions. Yet these concepts need to be rethought for an era of participatory culture.

Consider, for example, the framework for media literacy proposed by Thoman and Jolls (2005):

- Who created the message?
- What creative techniques are used to attract my attention?
- How may different people understand this message differently than me?

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- What lifestyles, values, and points of view are represented in – or omitted from – this message?
  - Why is this message being sent?

There is much to praise in these questions: they understand media as operating within a social and cultural context; they recognize that what we take from a message is different from what the author intended; they focus on interpretation and context as well as motivation; they are not tied up with a language of victimization.

Yet, note that each question operates on the assumption that the message was created elsewhere and that we are simply its recipients (critical, appropriating, or otherwise). We would add new complexity and depth to each of these questions if we rephrased them to emphasize individuals' own active participation in selecting, creating, remaking, critiquing, and circulating media content. One of the biggest contributions of the media literacy movement has been this focus on inquiry, identifying core questions that can be asked of a broad range of different media forms and experiences. This inquiry process seems key to overcoming the transparency problems identified above.

By contrast, education for the digital revolution stressed tools above all else. The challenge was to wire the classroom and prepare youth for the demands of the new technologies. Computer Clubhouses sprang up around the country to provide learning environments where youth could experiment with new media techniques and technologies. The goal was to allow students to set and complete their own tasks with the focus almost entirely on the production process. Little effort was made to give youth a context for thinking about these changes or to reflect on the new responsibilities and challenges they faced as participants in the digital culture. We embrace the constructivist principles that have shaped the Computer Clubhouse movement: youth do their best work when engaged in activities that are personally meaningful to them. Yet, we also see a value in teaching youth how to evaluate their own work and appraise their own actions, and we see a necessity of helping them to situate the media they produce within its larger social, cultural, and legal context.

We have developed an integrated approach to media pedagogy founded on exercises that introduce youth to core technical skills and cultural competencies, exemplars that teach youth to critically analyze existing media texts, expressions that encourage youth to create new media content, and ethics that encourage youth to critically reflect on the consequences of their own choices as media makers.

School-based and afterschool programs serve distinct but complementary functions. We make a mistake when we use afterschool programs simply to play catch-up on school-based standards or to merely reinforce what schools are already teaching. Afterschool programs should be a site of experimentation and innovation, a place where educators catch up with the changing culture and teach new subjects that expand children's understanding of the world. Afterschool programs focused on media education should function in a variety of contexts. Museums, pub-



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lic libraries, churches, and social organizations (such as the YWCA or the Boy Scouts) can play important roles, each drawing on its core strengths to expand beyond what can be done during the official school day.

## **Parents**

We also see an active role for parents to play in shaping children's earliest relationship to media and reinforcing their emerging skills and competencies. The new media technologies give parents greater control over the flow of media into their lives than ever before, yet parents often describe themselves as overwhelmed by the role that media plays in their children's everyday activities. As UK Children Go On-line (Livingstone & Bober, 2005) concluded, "Opportunities and risks go hand in hand...The more children experience one, the more they also experience the other." Rather than constraining choices to protect youth from risks, the report advocates doing a better job helping youth master the skills they need to exploit opportunities and avoid pitfalls.

Parents lack basic information that would help them deal with both the expanding media options and the breakdown of traditional gatekeeping functions. Most existing research focuses on how to minimize the risks of exposure to media, yet we have stressed the educational benefits of involvement in participatory culture. The first five or six years of a child's life are formative for literacy and social skills, and parents can play an important in helping children acquire the most basic versions of the skills we have described here. Throughout children's lives, parents play important roles in helping them make meaningful choices in their use of media and in helping them anticipate the consequences of the choices they make. Adults often are led by fears and anxieties about new forms of media that were not a part of their own childhood, and which they do not fully understand. There are few, if any, books that offer parents advice on how to make these choices or that offer information about the media landscape. Few education programs help parents to acquire skills and self-confidence to help their children master the new media literacies. There are few sites that provide up-to-date and ongoing discussions of some of the issues surrounding the place of media in children's lives.

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## The Challenge Ahead: Ensuring that All Benefit from the Expanding Media Landscape

Writing in the *Chronicle of Higher Education* (May 19, 2006), Bill Ivey, the former chairman of the National Endowment for the Arts, and Steven J. Tepper, a professor of Sociology at Vanderbilt University, described what they see as the long term consequences of this participation gap:

Increasingly, those who have the education, skills, financial resources, and time required to navigate the sea of cultural choice will gain access to new cultural opportunities....They will be the pro-ams who network with other serious amateurs and find audiences for their work. They will discover new forms of cultural expression that engage their passions and help them forge their own identities, and will be the curators of their own expressive lives and the mavens who enrich the lives of others....At the same time, those citizens who have fewer resources—less time, less money, and less knowledge about how to navigate the cultural system—will increasingly rely on the cultural fare offered to them by consolidated media and entertainment conglomerates...Finding it increasingly difficult to take advantage of the pro-am revolution, such citizens will be trapped on the wrong side of the cultural divide. So technology and economic change are conspiring to create a new cultural elite—and a new cultural underclass. It is not yet clear what such a cultural divide portends: what its consequences will be for democracy, civility, community, and quality of life. But the emerging picture is deeply troubling. Can America prosper if its citizens experience such different and unequal cultural lives?

Ivey and Tepper bring us back to the core concerns that have framed this essay: how can we “ensure that all students benefit from learning in ways that allow them to participate fully in public, community, [Creative] and economic life?” How do we guarantee that the rich opportunities afforded by the expanding media landscape are available to all? What can we do through schools, afterschool programs, and the home to give our youngest children a head start and allow our more mature youth the chance to develop and grow as effective participants and ethical communicators? This is the challenge that faces education at all levels at the dawn of a new era of participatory culture.



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